enduro

FRP Solutions for Water & Wastewater Treatment

Tank Covers • Baffle & Partition Walls • Enclosures

www.endurocomposites.com
Welcome to Enduro.

This catalog provides an overview to Enduro’s product lines for water and wastewater treatment. In the following pages, you will find information which explains the applications, features and benefits of Enduro baffle and cover systems, as well as the various options we offer for each solution.

Enduro has been a leader and innovator in this arena for the last 20 years, and our resume and product offering, along with a proven history of successful installations, give you and your clients the peace of mind you are looking for in a solution-provider.

Our belief is that this industry will remain critical to society and the protection of our water supply, and we will continue to invest in innovative products and solutions for water and wastewater treatment in the years to come.

If you are interested in one of our solutions, please email us at envsales@endurocomposites.com or call us at 800-231-7271 to inquire with one of our design engineers. You can also contact us through our website at www.endurocomposites.com.

Thank you for your interest in Enduro FRP solutions. We look forward to working with you.

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**Proven History**  
Enduro has served the water and wastewater industry for 30 years in the manufacture and development of FRP systems.

**Quality & Consistency**  
With a world-class quality testing laboratory, Enduro ensures consistent and reliable product performance through comprehensive programs of quality control.

**Turn Key Solutions**  
Because Enduro is vertically integrated, from design and engineering to pultrusion and fabrication, we can deliver these solutions on-time and on-budget, at the quality level our customers expect.

**Engineering & Design Assistance**  
Enduro’s experienced technical staff can provide engineering and design assistance for your project. If you have a unique design problem, chances are good we have encountered something similar before.

**Specification Assistance**  
The specification phase of a project is important to ensure the success of a tank cover or baffle wall system. With our broad history of installations in a wide variety of challenging environments, we can help you specify the right system attributes and structural properties to ensure long life and the best value for ownership.

**Installation-ready Solutions**  
Enduro’s water and wastewater products are delivered with components pre-fabricated, complete with drawings and numbered parts to ensure easy assembly in the field.

**Customer Service & Sales Support**  
Our Customer Service desk is available to assist with questions, product selection or quotes. Please call us today at 800-231-7271 or email envsales@endurocomposites.com.

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**Cover Applications**
- Odor Control
- VOC Emission Control
- Splash Control
- UV Screen / Algae Barrier
- Freeze / Thermal Barrier
- Water & Process Protection

**Baffle Applications**
- Flow Control
- Chemical Distribution
- Anoxic Zones
Enduro FRP Tank Cover Systems

Engineered for Water and Wastewater

Enduro FRP tank cover systems are engineered for the specific needs and requirements that are common for wastewater and water treatment operations.

Designed to give long-term service, each Enduro tank cover system is built upon 35 years of global leadership in research, development and production of FRP composites.

All Enduro tank covers are constructed with high-strength, pultruded FRP components, totally corrosion resistant, and designed for quick installation by local contractors.

Applications

To address a broad range of process, size and functional requirements, Enduro offers three tank cover systems, each with specific benefits and advantages. Applications for Enduro tank covers include:

- Odor Control
- VOC Emission Control
- Splash Control
- Freeze / Thermal Barrier
- UV Screen / Algae Barrier
- Water Protection
- Process Protection
- Improved Aesthetics

Tank Cover System Types

**XL6 Tank Cover System**

- Best Odor Control
- Gasketed for Tight Seal
- Easy to Remove & Install
- Self-contained Hatches
- Long Span Capability
- Safe for Foot Traffic

Designed for large basins, Enduro XL6 tank cover is the best low-profile cover system for odor control, accessibility, and service life. For more information and details on the Enduro XL6, please turn to page 6.

**SureGrip Tank Cover System**

- Good Odor Control
- Easy to Install
- Medium Span Capability
- Access Hatches
- Safe for Foot Traffic

Ideal for short-span channels and odd-shaped basins, Enduro SureGrip tank covers offer good odor control and easy installation. For more information and details on the SureGrip, please turn to page 10.

**Tuff Span Tank Cover System**

- Walk-in Access Option
- Easy to Install
- Translucent Panel Option
- Walkable Cover Option

For walk-in access or as a UV and debris barrier, Enduro Tuff Span tank covers offer a cost effective, corrosion resistant, structural enclosure. For more information and details on the Tuff Span cover, please turn to page 13.
Enduro FRP Tank Cover Systems

Benefits of Well-designed FRP

**Corrosion Resistant**
Manufactured with premium, iso-polyester and vinyl ester resin systems, Enduro tank covers offer superior protection against corrosive elements present in water and wastewater treatment operations as compared to aluminum.

**High Strength**
To ensure high strength and consistent quality, Enduro FRP structural components are manufactured by automated pultrusion process, which utilizes high glass-fiber content and results in unparalleled product consistency.

**Lightweight**
The favorable strength-to-weight properties of FRP contributes directly to reduced loads on tank walls and floors and to the ease of cover removability and installation.

**UV Protection**
Exterior coatings and stabilizers within the material provide UV protection for the Enduro FRP components and ensure long service life.

**Cost Savings**
The combination of corrosion resistance, high strength, and UV protection offered by well-designed FRP delivers longer service life, less maintenance, and life cost savings as compared to other materials.

Enduro System Design

**Turn Key Solutions**
Enduro tank cover component panels are fabricated with penetration openings and angle cuts as well as integral hatch framing and flashing to eliminate field fabrication and make installation quick and easy. Solutions include all necessary accessories, including hatches, gooseneck vents, nozzles, flashings and hardware.

**Customized System**
With multiple cover systems and configurations, our experienced technical staff customizes the design to meet project-specific load requirements including personnel, uplift, dead and snow loads.

**Low-profile**
With less air volume to process, Enduro’s low profile covers reduce operating cost and size of scrubber units compared to domes. Flat covers also improve aesthetic impact on communities, eliminate confined-entry issues, and provide protection for equipment located on top of the cover instead of below.

Typical Configurations

**Flat, Clear Span**
Channels and smaller tanks can be clear spanned using our XL6 panels (up to 20 feet) and SureGrip deck panels (up to 10 feet).

**Flat, Beam-supported**
Medium-sized tanks or tanks which allow column supports can be spanned utilizing a combination of beams and Enduro decking panels.

**Flat, Truss-supported**
For spans above 50 feet, Enduro offers truss-supported systems which utilize either our XL6 panels or Tuff Span panels.

**Walk-in & Enclosures**
Raised configurations or FRP buildings can be designed for applications which require walk-in access or additional vertical space above the water surface.

FRP Water & Wastewater Systems
XL6 Tank Cover System

System Overview

Designed with the needs of plant operators and installing contractors in mind, the features and benefits of the XL6 tank cover system are numerous and include effective odor control, easy-to-remove sections, long-span deck panels offering foot traffic safety, plus low profile advantage.

The XL6 flexible design is suitable for large rectangular or round basins and can be top-mounted on or flush with tank walls.

Configurations available for the XL6 tank cover:

- Flat, Clear Span
- Flat, Beam-Supported
- Flat, Truss-Supported

System Components

- Side Lap Bulb Gasket on Both Sides of Female Panels
- Lift Handle
- FRP Female Panel
- FRP Male Panel
- FRP Gooseneck Vent
- Self-contained access hatch, gasket sealed with hold-open bar
- FRP Primary Structural Beam
- Truss System Available for Larger Tanks
- 316 Stainless Steel Beam Seat
- FRP Flashing
- Textured Non-skid Surface

Key XL6 Features & Benefits

- **Best Odor Control**
  XL6 cover systems are effectively sealed with gaskets located at all outer edges, panel side laps and access hatches.

- **Complete Removability & Accessibility**
  Able to be handled by two workers without lifting equipment, each XL6 male panel can be removed individually after removing only four nuts, and each XL6 female panel can be freely lifted after removing its two adjacent male panels. In addition, XL6 access hatches are self-contained within one panel, allowing panel removal without affecting adjacent panels.

- **Long Span Capability**
  The XL6 system clears spans up to 20’. For longer span requirements, FRP beams and columns or steel truss members are utilized to support XL6 deck panels.

- **Easy, Low-cost Installation**
  Factory-fabricated deck panels are simply laid in place and require only half of the cover panels to be fastened to supports.

- **Corrosion Resistant**
- **High Strength**
- **Lightweight**
- **UV Protection**
- **Turn Key Solutions**
- **Customized System**
- **Non-skid Surface**
- **Low Profile**
XL6 Tank Cover System

Applications

➤ Headworks & Grit Covers
➤ Clarifiers
➤ Aeration & Equalization
➤ Sedimentation
➤ Sludge & Gravity Thickeners
➤ Chlorine Contact Basins
➤ Filtrate Storage Tanks
➤ Chemical Process Tanks

XL6 truss-supported tank cover system with FRP access hatches and safety grating
88' Diameter Gravity Thickener

XL6 clear span tank cover with access hatches & vents
40' Diameter Sludge Thickener Cover

XL6 beam-supported tank cover system
50' Diameter Clarifier

XL6 clear span tank cover system with access hatches
UV Disinfection Process

XL6 beam-supported cover - DAF cells. Cover panels can be handled by 2 workers alone.

XL6 clear span cover - Chemical Treatment Tank
Self-contained hatches permit easy panel removal.

XL6 beam supported covers with access hatches
53' x 60' Pre-treatment Tank Complex
## XL6 Tank Cover System

### Load Span Table

Maximum Allowable Load - Safety Factor = 2.5

<table>
<thead>
<tr>
<th>Span</th>
<th>Uniform Live or Snow</th>
<th>Concentrated Load*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L/D = 120</td>
<td>L/D = 180</td>
</tr>
<tr>
<td>20 ft.</td>
<td>32 psf</td>
<td>26 psf</td>
</tr>
<tr>
<td>18 ft.</td>
<td>39 psf</td>
<td>36 psf</td>
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<tr>
<td>16 ft.</td>
<td>50 psf</td>
<td>50 psf</td>
</tr>
<tr>
<td>14 ft.</td>
<td>65 psf</td>
<td>65 psf</td>
</tr>
<tr>
<td>12 ft.</td>
<td>89 psf</td>
<td>89 psf</td>
</tr>
</tbody>
</table>

Concentrated load distributed over 1’ x 2’ area.

**Typical Details**

- **Concrete Wall**
  - FRP end flashing with integral lift handle
  - Bulb gasket (factory installed)
  - SS expansion anchor

- **Flush Concrete Wall**
  - SS expansion anchor
  - FRP flatsheet
  - SS grommet

- **End to End**
  - Optional FRP cover plate with non-skid top surface
  - FRP beam

**XL6 strength demonstration:** Under a uniform load of 30 psf, deflection on a 20’ span is L/180.
**XL6 Tank Cover System**

**Specification**

**Part 1 - General**

1.01 Description of Work

The scope of this specification shall include fiberglass reinforced plastic (FRP) flat tank covers which may consist of tank cover deck panels; structural supports; flashing and trim; fasteners and anchors; gaskets and sealant.

1.02 Design Criteria

A. Design Loads

1. Live or Snow ______ psf
2. Wind Uplift ______ psf
3. Dead Load ______ psf

B. Design Limits

1. Dead + Live or Snow Load: Limit=L/120 (min); Factor of Safety=2.5
2. Wind Uplift less Dead Load: Deflection Limit=L/60; Factor of Safety=1.88
3. Personnel Load: Cover panels shall have ½” maximum deflection under 250 lb. concentrated load over 2.5 SF area located at mid-point of 20’ clear span.

C. Air Leakage

1. Air leakage shall not exceed 1 CFM/LF at gasketed panel joints and 2.2 CFM/LF at cover perimeter under -.5 inch water pressure per HVAC Air Duct Leakage Test in accordance with NEBB “Procedural Standards for Adjusting, Balancing, of Environmental Systems”.

D. Cover Panel Removability

1. Each cover panel shall be removable without having to remove no more than its two adjacent panels. Note: Each Enduro XL6 male panel can be removed individually.
2. Each cover panel shall be removable vertically and without cutting of a cover component.

**Part 2 – Products**

2.01 Manufacturer(s)

The standard for design, characteristics, and performance is Enduro XL6 Cover System as manufactured by Enduro Composites, Inc.

2.02 Materials

A. Fiberglass reinforced plastic (FRP) structural components including decking, beams, and framing shall be manufactured by pultrusion process.

1. Glass fiber reinforcements shall be minimum 50% of the material weight.
2. Materials shall be fire retardant with flame spread rating of 25 or less per ASTM E84.
3. Materials shall exhibit these Physical Properties (minimum)

   - Tensile Strength 40,000 psi ASTM D 638
   - Compressive Strength 37,000 psi ASTM D 695
   - Flexural Strength 45,000 psi ASTM D 790
   - Flexural Modulus 1,690,000 psi ASTM D 790
   - Izod Impact (Notched) 25 ASTM D 256
   - Water Absorption .25% max ASTM D 570

B. XL6 Tank Cover Panels

1. Resin type for FRP tank cover decking shall be UV stabilized, isophthalic polyester.
2. Deck panels shall be sealed at side-laps with factory installed, non-adhesive, 1” diameter neoprene bulb gasket.
3. Each deck panel shall have vertical lifting handles that are integral, located at each end, and flush with top of panel.
4. Top of tank cover decking shall be flat and have a non-skid, UV resistant surface.
5. Color of deck panels shall be standard gray or beige (u.n.o).

C. Hatches (if required)

1. Hatches shall be raised with one-leaf hatch door and fabricated from pultruded fiberglass components.
2. Access hatches shall be sized to fit inside a single deck panel so a panel with hatch can be removed without affecting adjacent panels.
3. Underside of hatch lid shall be sealed with factory installed, 3/8” diameter neoprene bulb gasket. Perimeter hatch curb shall be sealed to decking surface with sealant.
4. (Optional): Hatches shall have a stainless steel, hold-open device to prevent door from blowing open or closing on itself.
5. Hatches shall be secured with hand-operable latches and without special tools.
6. Hatch lids shall have a non-skid, UV resistant surface with plastic or stainless steel lift handles.
7. View port hatches shall be 12 inches square or less.

D. FRP Structural Framing (if required)

1. Resin type for FRP beams and framing members shall be UV stabilized, vinyl ester.

E. Trusses (if required)

1. Trusses shall be galvanized steel except where components are exposed to inside of tank. Components exposed to inside of tank shall be Stainless Steel (as suitable for the environment).
2. Trusses shall have minimum 6” clearance from top of tank cover to bottom of top chord.
3. Trusses shall be shipped in lengths up to 20’ (as feasible) to be bolted together by contractor.

F. Flashing and Trim

1. fiberglass flashing shall be isophthalic polyester.
2. Non-radius, end flashing shall be factory attached to deck panels.
3. Flashing with a radius or at perimeter of circular tank shall be a separate part and field attached by the contractor.

G. Air Vents and Connections (if required)

1. Gooseneck ventilation piping shall be FRP with plastic bird screen.
2. Stub-vent connections shall be FRP with blind flange extending 6 inches (min) from top of tank cover.

H. Pipe Penetrations

1. Existing or new pipe penetrations shall be retrofitted by Contractor to penetrate cover at a 90-degree angle.
2. Pipe penetrations shall be flashed in the field with a Seal-ite retrofit, zipper type, pipe flashing or equal.

I. Hardware

1. Fasteners, anchors, hinges, and other structural accessories located on the underside of cover shall be 304/316 Stainless Steel.
2. Perimeter flashing anchors, concrete anchors, or other hardware not exposed to the inside environment of tank shall be 304 Stainless Steel.

J. Gaskets and Seals

1. All panel side laps and perimeter conditions shall be gas keted.
2. Sikaflex®-1A sealant shall be applied by Contractor at various locations as required for odor containment.

For expanded specification, please contact us.
SureGrip Tank Cover System

System Overview

Enduro SureGrip tank cover systems are ideal for channels, odd-shaped basins, or covers with numerous penetrations.

SureGrip system components include SureGrip FRP deck panels, FRP beams, access hatches and stainless steel hardware.

Configurations available for the SureGrip tank cover:

![Flat, Clear Span](image1)

![Flat, Beam-Supported](image2)

SureGrip beam-supported cover system over 70’ diameter steel tank
Aeration & Equalization Basin

Key SureGrip Features & Benefits

- **Good Odor Control**
  SureGrip design includes EPDM gaskets at outer edges and tight panel joints that produce a relatively air-tight cover system.

- **Medium Span Capability**
  The SureGrip panels can clear span across channels with 10 ft. or less width. Supported by Enduro FRP beams, the SureGrip Cover System is suitable for larger basins as well.

- **Accessibility**
  With gritted, non-skid surface, high-strength SureGrip deck panels are designed for safe, operator foot traffic. Access Hatches are available in sizes from 1’ square view ports up to 4’ square sizes.

- **Easy, Low-cost Installation**
  The 12” wide SureGrip panels snap together and are bolted to FRP support beams that are typically spaced 6’ to 10’ apart.

- **Corrosion Resistant**
- **High Strength**
- **Lightweight**
- **UV Protection**
- **Turn Key Solutions**
- **Customized System**
- **Non-skid Surface**
- **Low Profile**
SureGrip Tank Cover System

Applications

▶ Headworks & Grit Covers
▶ Clarifiers
▶ Aeration & Equalization
▶ Sedimentation
▶ Sludge & Gravity Thickeners
▶ Chlorine Contact Basins
▶ Filtrate Storage Tanks
▶ Chemical Process Tanks

SureGrip beam-supported tank cover system
Sedimentation Basin

SureGrip beam-supported splash cover
Racetrack Aeration Basin

SureGrip beam-supported cover - 31’ diameter
Grit Basin

SureGrip beam-supported tank cover system and access hatches
Sedimentation Basin

SureGrip beam-supported cover with Tuff Span removable enclosure. See pg. 13 for more about Tuff Span enclosures. Aeration Basin
SureGrip Tank Cover System

Profile

12"

2/3"

Load Span Table

Maximum Allowable Load - Safety Factor = 2.5

<table>
<thead>
<tr>
<th>Span</th>
<th>Uniform Live or Snow</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L/D = 120</td>
</tr>
<tr>
<td>10 ft.</td>
<td>29 psf</td>
</tr>
<tr>
<td>9 ft.</td>
<td>40 psf</td>
</tr>
<tr>
<td>8 ft.</td>
<td>58 psf</td>
</tr>
<tr>
<td>7 ft.</td>
<td>86 psf</td>
</tr>
<tr>
<td>6 ft.</td>
<td>136 psf</td>
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</table>

Typical Detail

Part 1 – General

1.01 Description of Work

Scope of work shall include materials for fiberglass reinforced plastic (FRP) flat tank covers including: Cover deck panels; Structural supports; Flashing and trim; Fasteners and anchors; Gaskets and sealant.

1.02 Design Criteria

A. Design Loads

1. Live or Snow ______ psf
2. Wind Uplift ______ psf
3. Dead Load ______ psf

B. Design Limits

1. Dead + Live or Snow Load: Limit: L/120 (min); Factor of Safety = 2.5
2. Wind Uplift less Dead Load: Deflection Limit - L/60; Factor of Safety = 1.88
3. Personnel Load: Cover panels shall support 250 lb. concentrated load over a 2.5 SF area located at mid-span.

C. Hatches: Hatch covers accessible to foot traffic shall support a 300 lb. load spread over top of hatch.

D. Tank cover shall be designed as relatively airtight.

Part 2 – Products

2.01 Materials

A. SureGrip Tank Cover Deck Panels

1. FRP deck panels shall have top surface thickness of 3/16” (min). Deck leg supports shall be ¼” thick.
2. Resin type for FRP cover decking shall be UV stabilized, isophthalic polyester.

3. Glass fiber reinforcements shall be a minimum of 50% of the material weight.
4. Materials shall be fire retardant and have a flame spread rating of 25 or less per ASTM E84.
5. Materials shall exhibit these Physical Properties (at a minimum):

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
<th>Standard</th>
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<tbody>
<tr>
<td>Tensile Strength</td>
<td>30,000 psi</td>
<td>ASTM D 638</td>
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<tr>
<td>Compressive Strength</td>
<td>30,000 psi</td>
<td>ASTM D 695</td>
</tr>
<tr>
<td>Flexural Strength</td>
<td>30,000 psi</td>
<td>ASTM D 790</td>
</tr>
</tbody>
</table>

6. The top of the tank cover decking shall be flat and non-profiled with a factory applied, non-skid, UV resistant surface. Color shall be gray.

B. Hatches (if indicated on drawings)

1. Hatches shall be sized as indicated on drawings.
2. Hatches shall have a stainless steel hold-open device and hand-operable latch.
3. Lid shall have a factory-applied non-skid, UV resistant surface and plastic or stainless steel lift handle.

C. FRP Structural Framing: Materials shall be same as A. 2.– 4.

D. Flashing shall be FRP or 304 Stainless Steel.

E. Fasteners, anchors, and hinges, and other accessories shall be 316 Stainless Steel.

F. EPDM or neoprene gaskets shall be installed at end joints of deck panels and under flashing.

G. Sikaflex®-1A sealant shall be applied by contractor at various locations.

For expanded specification, please contact us.
Tuff Span Tank Cover System & Enclosures

System Overview

 Constructed with Tuff Span FRP building panels and FRP structural components, Tuff Span tank covers provide versatile configurations including low-profile, roof-type covers or raised, building-type covers.

The Tuff Span low-profile covers are installed over storage and process tanks for UV screens and debris protection. Tuff Span raised covers and enclosures can provide walk-in access to processes.

Tuff Span cover components include Tuff Span FRP building panels, FRP beams, access hatches and stainless steel hardware.

Configurations available for Tuff Span tank covers:

- **Flat, Beam-Supported**
- **Flat, Truss-Supported**
- **Walk-in & Enclosures**

Key Tuff Span System Features & Benefits

- **Walk-in Access Option**
  For maximum process viewing, Tuff Span walk-in covers offer an ideal solution.

- **Translucent or Opaque Cover Panels**
  Tuff Span Cover panels can be furnished in opaque color or translucent, which transmit natural lighting and can reduce energy bills.

- **Easy to Install**
  Enduro’s complete solution includes delivering pre-cut structural members and finished panel lengths for easy installation.

- **Custom Design & Specifications**
  With our full line of Tuff Span FRP structural building panels and shapes, the Enduro engineering and design team can assist with developing customized solutions for a broad range of conditions.

  Please contact us for assistance with developing a tank cover or enclosure design and specification for your application and requirements.

- **Corrosion Resistant**
- **High Strength**
- **Lightweight**
- **UV Protection**
- **Turn Key Solutions**
- **Customized System**
- **Low Profile**
Tuff Span Tank Cover System & Enclosures

Applications

- UV Screens
- Sludge Drying Beds
- Water Storage
- Chlorine Contact Basins
- Filtrate Storage Tanks
- Chemical Process Tanks
Long recognized as leading FRP structural materials, Tuff Span building panels and beams are used as primary components in Tuff Span tank covers and walk-in enclosures.

The innovative structural shapes are also used as framing components in Enduro XL6 and SureGrip covers plus Enduro baffle wall. Utilizing cavity shapes for increased stability, lateral bracing needs for these beams can be eliminated. The sections have winged-flanges for easy-access, fastening locations.

In addition to the single profile and shapes shown below, Enduro offers a full line of Tuff Span FRP building panels along with FRP pultruded angles, channels, shapes, and flat sheet. Many of these sections are used in the Enduro tank cover and baffle wall systems. For additional information on Tuff Span building panels or our structural shapes, please contact us for a brochure or visit our website at www.endurocomposites.com.

### Tuff Span Panel

**7.2D x 1.75 FR 450**

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<thead>
<tr>
<th>Uniform Load PSF</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
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<tbody>
<tr>
<td>Maximum 3 Span</td>
<td>10'6&quot;</td>
<td>9'2&quot;</td>
<td>8'4&quot;</td>
<td>7'8&quot;</td>
<td>7'3&quot;</td>
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Maximum spans shown represent three span condition. Deflection Limit = L/60; Factor of Safety = 2.5

### 8F6

**Allowable Uniform Load - Unbraced**

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<th>L/D = 180</th>
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<td>24</td>
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<td>77</td>
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**BEAM FOS = 2.5**

### 12F12 Flanged Tube

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**BEAM FOS = 2.5**

### 18F17 Flanged Tube

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**BEAM FOS = 2.5**

### Enduro FRP Structural Shapes

#### Flanged Beams
- 6" x 6" x 3/8" Wide Flange
- 8F6 Purlin/Girt
- 12F12 Flanged Tube
- 12S12 Flanged Tube
- 18F17 Flanged Tube

#### Flat Sheet
- 3' x 10' x 1/8" Thick
- 3' x 10' x 3/16" Thick
- 3' x 10' x 1/4" Thick
- 3' x 10' x 3/8" Thick
- 3' x 10' x 1/2" Thick
- 4 5/8" x 10' x 1/4" Strip

#### Channel
- 2" x 1" x 3/16"
- 3" x 1" x 3/16"
- 4" x 1 3/8" x 3/32"
- 4" x 1 1/8" x 1/4"
- 4 3/4" x 3 1/4" x 1/4"
- 6" x 1 5/8" x 3/32"
- 6" x 1 5/8" x 3/16"
- 6" x 2" x 3/16"
- 6 1/2" x 8" x 1/4"
- 8" x 1 3/4" x 5/16"
- 10" x 2 3/4" x 3/8"

#### Angle
- 2" x 2" x 1/4"
- 3" x 3" x 1/4"
- 3" x 3" x 3/8"
- 4" x 4" x 3/8"
- 6" x 6" x 3/8"

#### Square Tube
- 1 5/8" x 1 5/8" x 1/8"
- 2" x 2" x 1/4"
- 3" x 3" x 1/4"
- 4" x 4" x 1/4"

#### Solid Rod
- 1" x 1/8" Square
- 1" x 1/8" Round

#### Round Tube
- 2 3/8" x 1/4"

#### Rectangular Tube
- 3" x 4" x 1/4"
Enduro FRP Structural Baffle & Partition Wall

Engineered for Water and Wastewater

Enduro FRP structural baffle and partition wall systems are specifically designed for potable water and wastewater treatment flow control. Enduro baffle and partition walls are pre-engineered systems composed of fiberglass reinforced plastic baffle panels, angles and framing members.

Enduro’s baffle wall systems offer industry-leading design flexibility in addition to a superior combination of strength and corrosion resistance.

Certified to NSF/ANSI Standard 61

All Enduro baffle and partition wall systems are certified per NSF/ANSI Standard 61 for processing of potable water.

Ideal for New or Retrofit Basins

Enduro baffle and partition wall systems are an excellent choice for either new or retrofit basins. Their light weight makes them the perfect choice for retrofits, and their design flexibility makes them an excellent choice for new projects as well, allowing easy modification in the event of future process changes.

Baffle & Partition Wall System Types

**“D” Series System**
- High Strength Baffles
- Bolted Installation
- Low Cost System

**“H” Series System**
- Long Span Baffles
- Bolted & Non-bolted Installation
- Panels Held in Place by Angles

Typical baffle configuration: SlideGuide angles and base plates are typically prefabricated to columns by Enduro. Concrete anchors for SlideGuide angles and column base plates shall be adhesive type 316 stainless steel.
Enduro FRP Structural Baffle & Partition Wall

Benefits of Well-designed FRP

**Corrosion Resistance**

Designed for corrosive and challenging structural conditions, Enduro baffle and partition walls deliver longer life than concrete, wood, steel or aluminum while eliminating maintenance.

**High Strength**

To ensure high strength and consistent quality, Enduro FRP structural components are manufactured by automated pultrusion process, which utilizes high glass-fiber content and results in unparalleled product consistency.

**Lightweight**

Weighing 90% less than a comparable concrete system, an Enduro FRP baffle wall can reduce loads on tank walls and floors. In addition, its lightweight also eases section removability and installation.

**Increased Basin Volume**

With ¼” maximum thickness, Enduro baffle panels can take up 95% less basin volume compared to 6-8” thick concrete walls.

**Easy Reconfiguration**

If flow pattern adjustments are needed, Enduro wall systems can be dismantled and relocated to accommodate changes in flow requirements.

Enduro System Design

**Turn Key Solutions**

Enduro offers a single-source responsibility and solution for design, manufacture and fabrication of FRP components. Components are manufactured in custom lengths and factory fabricated that can include pre-drilled holes and attachment of base plates and angles that minimizes field fabrication and installation.

**Customized System**

With multiple wall types and system options, our experienced technical staff customizes the design to meet the requirements and needs for each project. Enduro baffle walls can include FRP baffle panels (solid or perforated), structural framing, baffle doors, and hardware.

Typical Configurations & Options

- **Perforated Wall**
  - Baffle panels can be shop-perforated for increased water mixing and flow.

- **Cantilevered Column Wall**
  - Non-braced columns may avoid interference with process equipment.

- **Integrated Roof**
  - Baffle wall framing can be integrated with basin covers to reduce cost.

- **Solid Wall with Bottom Void**
  - 1-6” voids between baffle and basin bottom to ease sediment cleaning.

- **Doors**
  - Baffle doors for man ways and access are available.
Enduro “D” Structural Baffle & Partition Walls

System Overview

To meet the need for a lower cost, FRP baffle panel that would effectively address rigidity and other structural requirements, Enduro developed its “D” series panel.

With an advantaged strength to weight ratio, the 4” deep, profiled section has an extremely efficient design to address demanding wall requirements.

Designed for bolted installation, Enduro’s “D” system has a proven track record of outstanding performance for numerous installations.

Typical Details

- **Panel Side Lap**
- **Concrete Wall**
- **12F12 FRP Column**

*D* structural baffle wall system - solid and slotted with FRP columns
Sedimentation and Flocculation Basins
Enduro “D” Structural Baffle & Partition Walls

Load Span Table

<table>
<thead>
<tr>
<th>Water Differential</th>
<th>1” Uniform Load</th>
<th>2” Uniform Load</th>
<th>3” Uniform Load</th>
<th>4” Uniform Load</th>
<th>5” Uniform Load</th>
<th>6” Uniform Load</th>
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<tbody>
<tr>
<td>L/D FOS</td>
<td>L/D FOS</td>
<td>L/D FOS</td>
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<td>L/D FOS</td>
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<td>72 &gt;3</td>
<td>79 &gt;3</td>
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</tbody>
</table>

Maximum spans are based on each panel being fastened with three (3) bolts to each support.

Specification: Fiberglass Reinforced Plastic Baffle Wall - D Series

Part 1 – General
1.01 Description of Work
The scope of this specification shall include materials for the fiberglass reinforced plastic (FRP) Baffle Wall System including FRP baffle wall panels; FRP columns; FRP angles; column base plates/angles; fasteners and connections.

1.02 Design Criteria
A. Design Load (greater of water differential or wind load)
   1. Water Differential: _____ in. (uniform load over wall)
   2. Wind Load: _____ lbs./SF uniform load
B. Deflection Limit and Factor of Safety
   1. Baffle Panels: L/D=______; Max Defl=Panel Depth; FOS=2.0
   2. Columns: L/D=100; FOS=2.5

Part 2 – Products
2.01 Manufacturer
Standard for design, characteristics, and performance is Enduro D Series Baffle Wall manufactured by Enduro Composites, Inc.

2.02 Materials
A. FRP Baffle Panels, Columns, and Angles
   1. FRP baffle panels, columns, angles, and associated components shall be ANSI/NSF Standard 61 certified for potable water application (as required).
   2. FRP Baffle Panels shall exhibit these minimum properties:
      Stiffness (EI) 5,591,000 lb-in^2/ft
      Moment Capacity 19,700 lb-in/ft
   3. FRP structural materials shall exhibit these minimum properties:
      Tensile Strength 40,000 psi ASTM D 638
      Flexural Strength 45,000 psi ASTM D 790
      Flexural Modulus 1,690,000 psi ASTM D 790
      Izod Impact (Notched) 25 ASTM D 256
      Water Absorption .25% maximum ASTM D 570

B. Hardware
   1. Fasteners, anchors, and other structural hardware shall be 304/316 Stainless Steel.
   2. Submerged anchors shall be epoxy adhesive type.

For expanded specification, please contact us.
Enduro “H” Structural Baffle & Partition Wall

System Overview

As a global leader for FRP structural systems, Enduro developed the “H” Series baffle panel and the innovative SlideGuide assembly system.

The \( \frac{1}{4} \)” thick, Enduro “H” series are the strongest FRP baffle panels available and are utilized in both bolted and non-bolted installations. In the SlideGuide system, the “H” baffle panels, which do not require fastening, are inserted between and held in place by FRP angles. With a long and proven track record of outstanding performance, the Enduro “H” series and SlideGuide assembly has led a movement away from concrete and wood to the Enduro FRP baffle system.

Typical Details

- **Baffle Panel Stacking**
- **Bolted 12F12 FRP Column**
- **Bolted 12S12 FRP Column**
### Enduro “H” Structural Baffle & Partition Wall

#### Load Span Table

<table>
<thead>
<tr>
<th>Water Differential</th>
<th>2”</th>
<th>3”</th>
<th>4”</th>
<th>5”</th>
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<th>8”</th>
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<tr>
<td>Span (Ft)</td>
<td>L/D</td>
<td>FOS</td>
<td>L/D</td>
<td>FOS</td>
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</tbody>
</table>

Maximum spans are based on non-fixed connection with panels being restrained by SlideGuide angles on each side. Please contact Enduro for Load/Span data with a bolted H Series installation.

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### Specification: Fiberglass Reinforced Plastic Baffle Wall - H Series

#### Part 1 – General

**1.01 Description of Work**

The scope of this specification shall include materials for the fiberglass reinforced plastic (FRP) Baffle Wall System including FRP baffle wall panels; FRP columns; FRP angles; column base plates/angles; fasteners and connections.

**1.02 Design Criteria**

- **A. Design Load (greater of water differential or wind load)**
  1. Water Differential: _____ in. (uniform load over wall)
  2. Wind Load: _____ lbs./SF uniform load
- **B. Deflection Limit and Factor of Safety**
  1. Baffle Panels: L/D=_____; Max Defl=Panel Depth; FOS = 2.0
  2. Columns: L/D=100; FOS=2.5

#### Part 2 – Products

**2.01 Manufacturer**

Standard for design, characteristics, and performance is Enduro H Series Baffle Wall manufactured by Enduro Composites, Inc.

**2.02 Materials**

- **A. FRP Baffle Panels, Columns, and Angles**
  1. FRP baffle panels, columns, angles, and associated components shall be ANSI/NSF Standard 61 certified for potable water application (as required).
  2. FRP Baffle Panels shall exhibit these minimum properties:
     - Stiffness (EI) 1,780,000 lb-in/ft
     - Moment Capacity 39,200 lb-in/ft

- **3. FRP structural materials shall exhibit these minimum properties:**
  - Tensile Strength 48,000 psi ASTM D 638
  - Flexural Strength 58,000 psi ASTM D 790
  - Flexural Modulus 2,000,000 psi ASTM D 790
  - Izod Impact (Notched) 25 ASTM D 256
  - Water Absorption .25% maximum ASTM D 570

- **4. FRP Materials shall include UV stabilized polyester resin; surfacing veil at top and bottom sides; gray color.**

- **5. Factory cut edges and drilled holes shall be sealed with ANSI/NSF approved material.**

- **6. FRP baffle panels shall be Enduro Series H, 2.75 x .25 profile; 2.75” depth; 1/4” nominal thickness; 50% glass fiber reinforcing (by wt.); with top, horizontal ribs sloped downward not less than 10 degrees to minimize sediment build-up.**

- **7. FRP Columns shall be Enduro Type _________ with 50% glass fiber reinforcing (by wt.). Column base plates or angles shall be 304/316 Stainless Steel.**

- **8. FRP Angles shall be 1/4” thick and 90 degrees.**

**B. Hardware**

- **1. Fasteners, anchors, and other structural hardware shall be 304/316 Stainless Steel.**
- **2. Submerged anchors shall be epoxy adhesive type.**

*For expanded specification, please contact us.*
Enduro FRP Structural Baffle & Partition Walls

Bolted Installation

“D” series baffle panels are nested at sides and fastened to supports. This system requires 50% less angle supports.

SlideGuide Installation

“H” series baffle panels are stacked from basin bottom to top and do not require fastening to supports.

Enduro SlideGuide "H" baffle series and columns utilized inside a wastewater chlorine contact basin.

Enduro "D" & "H" baffle wall systems with top-braced FRP columns Flocculation and Sedimentation Basin

Enduro FRP SlideGuide "H" baffle series stacked as high as 42 ft. in a clearwall reservoir. For installation under existing tank covers, 2-foot wide Enduro Baffle panels easily pass through access hatches.

“H” series baffle panels are stacked from basin bottom to top and do not require fastening to supports.
FRP Technical Data

Corrosion Resistance - Resin Systems

Two standard composite resin systems are available. For most applications, isophthalic polyester fire-retardant (FR-P) is the more widely used. A vinyl ester composite fire-retardant resin system (FR-VE) is recommended where strong acids (such as hydrochloric acid), strong alkalies (such as caustic soda), organic solvents and halogenated organic conditions exist. An abbreviated Guide is provided below to assist in the selection of the proper resin system for individual application.

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<td>Acetic Acid 25%</td>
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<td>FR-P</td>
<td>FR-P</td>
</tr>
<tr>
<td>Phosphoric Acid 85%</td>
<td>FR-P</td>
<td>FR-P</td>
</tr>
<tr>
<td>Sodium Bicarbonate 10%</td>
<td>FR-P</td>
<td>FR-P</td>
</tr>
<tr>
<td>Sodium Bisulfate</td>
<td>FR-P</td>
<td>FR-P</td>
</tr>
<tr>
<td>Sodium Carbonate</td>
<td>FR-P</td>
<td>FR-P</td>
</tr>
<tr>
<td>Sodium Chloride</td>
<td>FR-P</td>
<td>FR-P</td>
</tr>
<tr>
<td>Sodium Hydroxide 1-50%</td>
<td>FR-P</td>
<td>FR-P</td>
</tr>
<tr>
<td>Sodium Hypochlorite 5%</td>
<td>FR-P</td>
<td>FR-P</td>
</tr>
<tr>
<td>Sulfuric Acid 0-30%</td>
<td>FR-P</td>
<td>FR-P</td>
</tr>
<tr>
<td>Sulfuric Acid 30-50%</td>
<td>FR-P</td>
<td>FR-P</td>
</tr>
<tr>
<td>Sulfuric Acid 50-70%</td>
<td>FR-P</td>
<td>FR-P</td>
</tr>
</tbody>
</table>

FR = Fire-Retardant;  
P = Polyester Resin;  
VE = Vinyl Ester Resin;  
(*) = Not recommended to exceed this temperature;  
Call = Call for recommendations.

Information contained in this chart is based on data from raw material suppliers and collected from several years of actual industrial applications. Temperatures are not the minimum nor the maximum (except where specifically stated) but represent standard test conditions. The products may be suitable at higher temperatures, but individual test data should be required to establish such suitability. The recommendations or suggestions contained in this chart are made without guarantee or representation as to results. We suggest that you evaluate these recommendations and suggestions in your own laboratory or by actual field trial prior to use.

Typical Properties of Structural FRP

<table>
<thead>
<tr>
<th>Mechanical (coupon)</th>
<th>FR-P</th>
<th>FR-VE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Logitudinal Direction</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ultimate Tensile Strength, PSI (ASTM D638)</td>
<td>42,000</td>
<td>42,000</td>
</tr>
<tr>
<td>Ultimate Compressive Strength, PSI (ASTM D695)</td>
<td>37,000</td>
<td>37,000</td>
</tr>
<tr>
<td>Ultimate Flexural Strength, PSI (ASTM D790)</td>
<td>32,000</td>
<td>35,000</td>
</tr>
<tr>
<td>Tensile Modulus, PSI x 10⁶</td>
<td>2.5</td>
<td>3.0</td>
</tr>
<tr>
<td>Compressive Modulus, PSI x 10⁶</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Flexural Modulus, PSI x 10⁶</td>
<td>1.6</td>
<td>2.0</td>
</tr>
<tr>
<td>Ultimate Shear Strength, PSI</td>
<td>5,500</td>
<td>7,000</td>
</tr>
<tr>
<td>Ultimate Bearing Stress, PSI</td>
<td>30,000</td>
<td>35,000</td>
</tr>
<tr>
<td>Izod Impact Strength, Ft.-Lbs. per inch of notch (ASTM D256) (sample thickness ½” except ⅛” for rod)</td>
<td>25</td>
<td>30</td>
</tr>
<tr>
<td><strong>Electrical</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electric Strength, short term in oil, ⅛”, vpm (ASTM D149)*</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>Electric Strength, short term in oil, KV per inch</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>Dielectric Constant, 60 Hz. (ASTM D150)*</td>
<td>5.6</td>
<td>5.2</td>
</tr>
<tr>
<td>Dissipation Factor, 60 Hz. (ASTM D150)*</td>
<td>0.03</td>
<td>0.03</td>
</tr>
<tr>
<td><strong>Fire Retardant Properties</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flame Resistance, ign/burn, seconds (FTMS 406-2023)</td>
<td>75/75</td>
<td>75/75</td>
</tr>
<tr>
<td>Intermittent Flame Test, rating (HLT-15)</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Flammability Test, (ASTM D635) average time of burning 5 seconds, average extent of burning 15mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface Burning Characteristics, maximum (ASTM E84)</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td><strong>Transverse Direction</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ultimate Tensile Strength, PSI</td>
<td>7,000</td>
<td>10,000</td>
</tr>
<tr>
<td>Ultimate Compressive Strength, PSI</td>
<td>15,000</td>
<td>20,000</td>
</tr>
<tr>
<td>Ultimate Flexural Strength, PSI</td>
<td>10,000</td>
<td>14,000</td>
</tr>
<tr>
<td>Tensile Modulus, PSI x 10⁶</td>
<td>0.8</td>
<td>1.0</td>
</tr>
<tr>
<td>Compressive Modulus, PSI x 10⁶</td>
<td>1.0</td>
<td>1.2</td>
</tr>
<tr>
<td>Flexural Modulus, PSI x 10⁶</td>
<td>0.8</td>
<td>1.0</td>
</tr>
<tr>
<td>Ultimate Shear Strength, PSI</td>
<td>5,500</td>
<td>6,000</td>
</tr>
<tr>
<td>Ultimate Bearing Stress, PSI</td>
<td>30,000</td>
<td>35,000</td>
</tr>
<tr>
<td>Izod Impact Strength, Ft.-Lbs. per inch of notch (ASTM D256)</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Barcol Hardness (ASTM D2583-75)</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td><strong>Full Section in Bending</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modulus of Elasticity, PSI x 10⁶</td>
<td>2.5</td>
<td>3.0</td>
</tr>
<tr>
<td>Tensile Strength, PSI</td>
<td>20,000</td>
<td>25,000</td>
</tr>
<tr>
<td>Compressive Strength, PSI</td>
<td>20,000</td>
<td>25,000</td>
</tr>
<tr>
<td><strong>Thermal</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermal Coefficient of Expansion, Inches/Inch°F (ASTM D696)**</td>
<td>5 x 10⁻⁴</td>
<td>5 x 10⁻⁴</td>
</tr>
<tr>
<td>Thermal Conductivity, BTU per Sq. Ft./Hr.°F/In. (ASTM C-1776-76)</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Specific Heat, BTU/Lb.°F</td>
<td>0.28</td>
<td>0.28</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td></td>
<td></td>
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<tr>
<td>Density, Lbs./In.³ (ASTM D792)</td>
<td>0.065</td>
<td>0.065</td>
</tr>
<tr>
<td>Specific Gravity (ASTM D792)</td>
<td>1.80</td>
<td>1.80</td>
</tr>
<tr>
<td>Water Absorption, Max. % by weight (24 hour immersion) (ASTM D570)</td>
<td>0.50</td>
<td>0.50</td>
</tr>
</tbody>
</table>

* Specimen tested perpendicular to laminate face.  
Note: 1 PSI = 6.894 K Pa, 1 Ft.-Lb./In. = 5.443 kg-m/m  
** Indicates reported value measured in logitudinal direction.  
Note: Depending on the specific glass content and resin, the strength and stiffness properties may be significantly higher.